GFK–0832A
June 1994

NEMA4 I/O Station

IC66*BXD022

The **NEMA4 I/O Station** consists of a 24 VDC Source I/O block installed in a rugged aluminum NEMA4 housing. The block is pre-wired to receptacles in the housing, for simple connection of field wiring.

Block Features

The block in the I/O Station can be used with 2–wire and 3–wire solid state sensors and electromechanical sensors. It has 16 discrete circuits, each easily configured to be an input, tristate input, or output. Output circuits can be connected directly to input circuits without the use of other components or inversion of logic states.

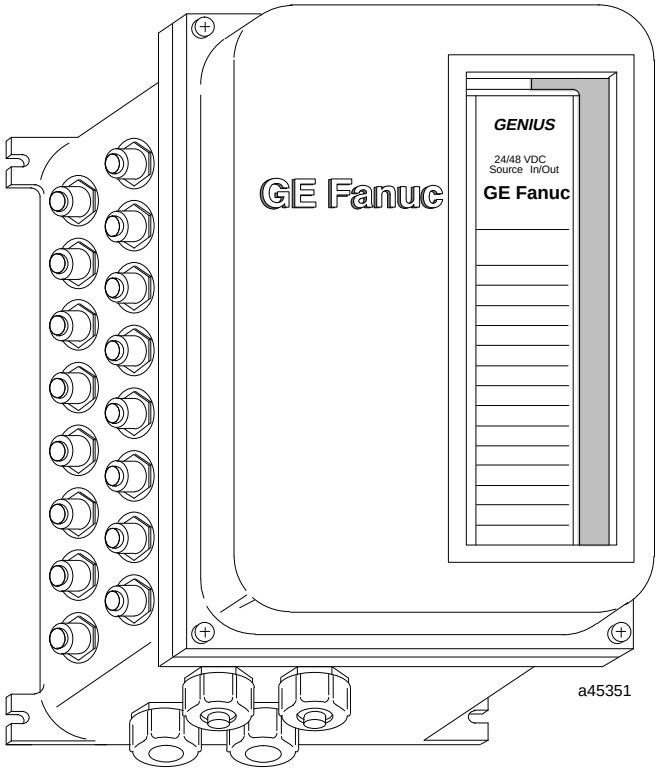
The block's LEDs verify proper block operation and CPU communications. Individual circuit LEDs on the logic side indicate voltage present on inputs and outputs.

Housing Features

The I/O Station's NEMA4 housing provides a measure of protection against falling, splashed, and hose-directed water. It can be used indoors or outdoors. The block will not be damaged by the formation of ice on the housing.

I/O connections to the block are made through the housing via Brad Harrison™-style molded receptacles. Communications and power cables are installed via pass-through water-tight connectors.

The housing has a transparent window in the cover so the block's LEDs can be seen.



Using this Datasheet

This datasheet describes installation of the I/O Station. It also briefly summarizes information about the operation, configuration, and diagnostics features of the I/O block. If you need more information about the I/O block, please see the *Discrete and Analog Blocks User's Manual* (GEK-90486-2). For information about systems and communications, including bus specifications, refer to the *System and Communications Manual* (GEK-90486-1).

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Mounting the I/O Station

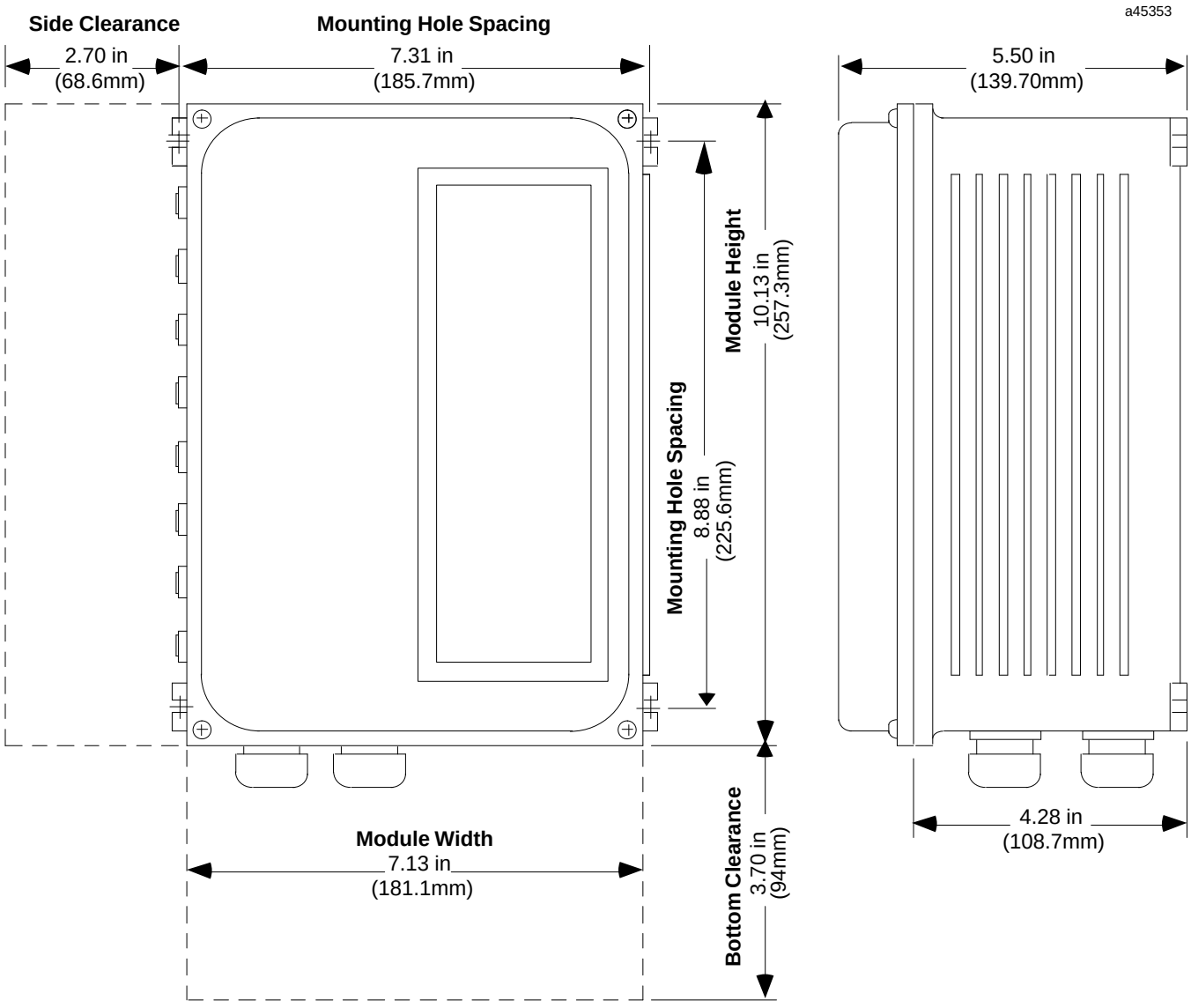
The illustration below shows:

- overall dimensions of the I/O Station
- mounting hole spacing
- wiring clearances required from the side and bottom of the housing to a wall, panel, or other obstruction.

Equipment Required

Quantity 4: #10 mounting screws

Mount the block in the orientation shown below. Drill screw or bolt holes for #10 hardware. Position the station so that the notches in the flanges line up with the mounting holes. Mount the block using #10 screws. Use star washers to provide ground integrity.



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Power and Bus Connections

Power and bus cables must be 0.25" to 0.375" in diameter. The power cable must include a ground wire, to bring chassis ground into the module. Three to six .250" x .032" female quick disconnects are required.

Note: The I/O Station can be located on a bus stub downstream of another device that performs bus switching. It cannot be directly connected to a dual bus.

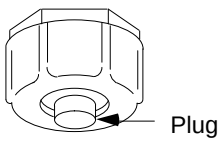
Remove the housing cover to begin cable installation.

Caution

After installation, the housing cover must be firmly installed on the base. Recommended screw torque is 12 in/lbs.

Cable Installation

Pass the incoming serial bus and power cables through connectors SI and PI on the housing bottom. Connectors SO and PO can be used to daisy-chain the bus and/or power cable to another device. To use either of these connectors, first loosen the nut and remove the plug.

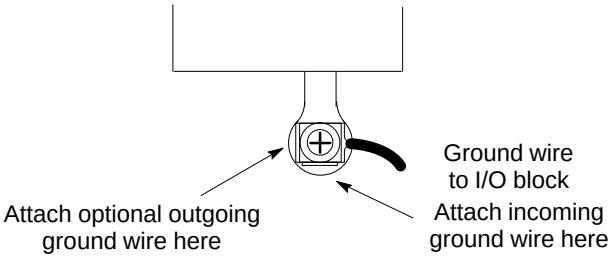


Caution

Tighten the connector nuts firmly around all bus and power cables before completing the installation.

GroundConnections

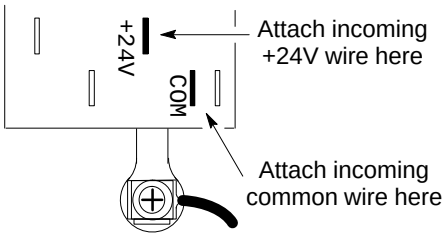
Using a quick disconnect, attach the power cable ground wire to the ground terminal near the wiring board:



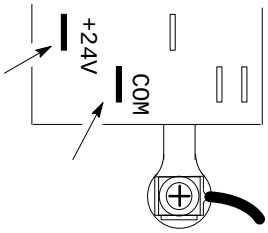
If you are daisy-chaining the power cable out to another device, connect the ground wire of the outgoing power cable to the remaining ground terminal.

Power Connections

Using two quick disconnects, attach the incoming power wires to the wiring board as shown below.



If you are daisy-chaining the power cable out to another device, connect the outgoing power wires.



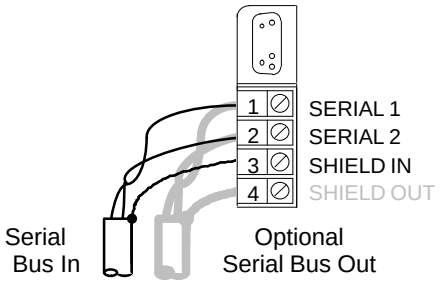
Power Disconnects

Wire external power disconnects so that block power and input power will be removed *at the same time.*

Caution: If circuit power is not removed at the same time as block power, the block may power up when multiple inputs are activated, even though one leg of power has been removed from the block.

Serial Bus Connections

Connect the incoming serial bus to terminals 1 – 3 on the I/O block, as shown below. If there is also an outgoing bus cable, connect it to terminals 1, 2, and 4. Recommended torque for the terminal screws is 6 in/lb (.678N/M).



If the station is at the end of the bus (no bus out cable), connect a terminating resistor of the appropriate type (see the *System and Communications User's Manual*) across its Serial 1 and Serial 2 terminals.

Connecting I/O Devices

Connect I/O devices to the Brad Harrison-style connectors in the side of the housing. Each connector can be used for an input or output. **Note:** To avoid possible contamination, leave covers on unused connectors.

Wiring for Tristate Inputs

If any input is configured as a Tristate Input, it will be necessary to install a 1.6K ohm resistor across that circuit's input and +24 volt terminals (inside the housing). This added resistance is required to use the Open Wire diagnostic. The circuit LED will glow dimly.

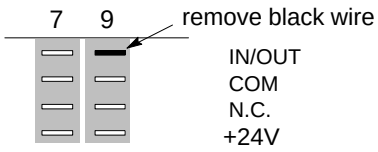
Dual Input or Output Connection

Dual input and output devices require a simple change to the factory wiring inside the housing. A dual input or output device uses one connector in the housing, but counts as <u>two</u> circuits on the I/O block. For practical purposes, these two circuits should be located near each other on the wiring board (see the diagram at the bottom of the page).

1. Be sure power to the I/O Station is OFF before proceeding.
2. Decide on two circuits to use for the device. For example, 7 and 9.
3. Install the dual input or output device at the housing connector for either of the two selected circuits. Keep the connector for the other circuit covered.

   Caution: Be sure no device is installed on the connector that corresponds to the other circuit of the pair. Unexpected operation would result.
4. On the wiring board, make the following changes. **Note:** Using long-nose pliers, grasp wires by the crimped terminal in the strain relief area ONLY.

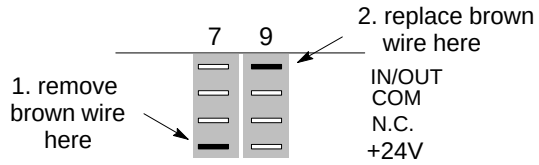
   First, remove the black wire from the In/Out terminal corresponding to the *unused* circuit. For example (if 9 were not used):



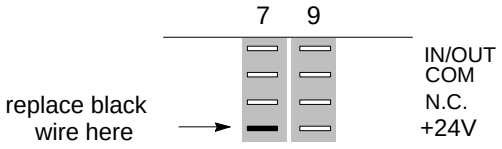
5. Continue below for a dual output or input.

For a Dual Output:

Remove the brown wire (+ 24V) from the other terminal of the pair. Install it on the In/Out terminal where you removed the first black wire.

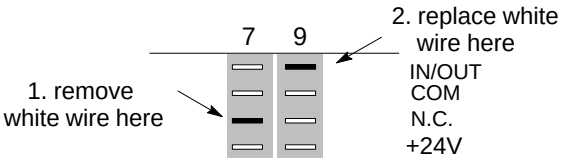


Install the first (black) wire you removed on the + 24V terminal where you removed the brown wire:



For a Dual Input:

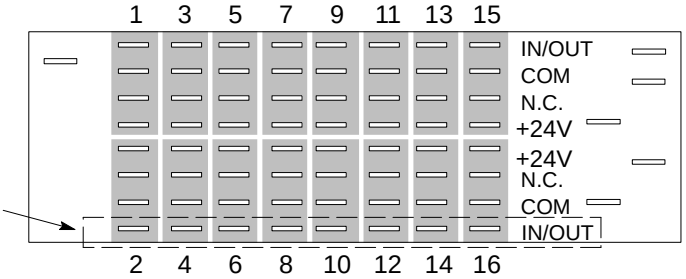
Remove the white wire (No Connect) from the other terminal of the pair. Install it on the In/Out terminal where you removed the first black wire.



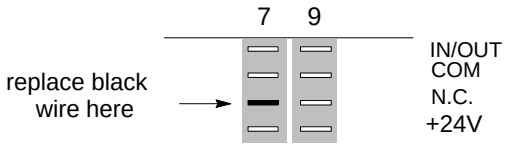
Terminals on the Wiring Board

There are 4 terminals for each I/O circuit: In/Out, Common, No Connect, and +24V.

All terminals in a row have the same function. For example, the In/Out terminals for even-numbered circuits 2 to 16 are in the same row.



Install the first (black) wire you removed on the NC terminal where you removed the white wire.



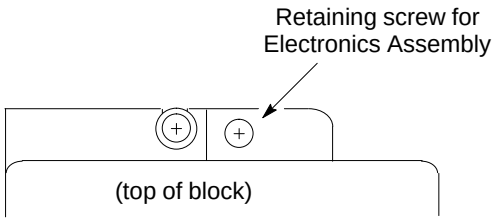
Block or Terminal Assembly Removal

The block's Electronics Assembly can be removed and replaced without removing field wiring or reconfiguring the block.

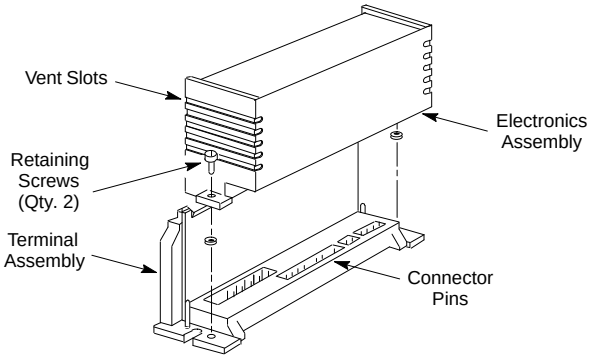
If you remove the entire block, it will be necessary to remove the wiring and to reconfigure the block.

Removing the Block's Electronics Assembly

1. Disconnect power to the I/O station and remove the housing cover.
2. Using a Phillips-head screwdriver, unscrew the Electronics Assembly retaining screws at the top and bottom of the block.



3. **Using the special I/O Station Block Puller** , engage the tabs in the first vent slots.
4. Pull the Electronics Assembly upward.



Warning

If power is applied to the field terminals, power is also exposed on the connector pins at the base of the Terminal Assembly, and electrical shock hazard exists. Do not touch the connector pins! **Death or injury may result.**

Inserting the Electronics Assembly

1. Align the Electronics Assembly within the guides and push it down firmly.

Caution

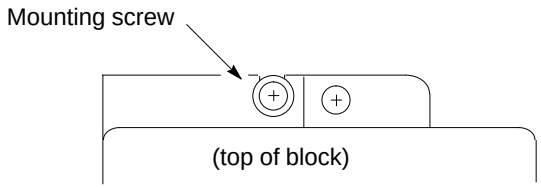
Do not exert excessive force; it may damage the block.

If unusual resistance is met, remove the Electronics Assembly. If power is applied to the block, DO NOT TOUCH THE CONNECTOR PINS! Inspect the Terminal Assembly, connector receptacle, and connector edge board (on the Electronics Assembly). Remove any obstacles and reinsert the Electronics Assembly. Pay close attention to the alignment of the guide pins.

2. Secure the Electronics Assembly with the retaining screws.

Removing the Block

1. Disconnect power to the I/O station and remove the housing cover.
2. Remove the wiring from the Terminal Assembly.
3. Using a Phillips-head screwdriver, unscrew the mounting screws at the top and bottom of the block.



4. Carefully remove the block.

Reverse the procedure to replace the block .

After replacing the block, re-install the wiring. Wiring follows standard color code convention. The block must be reconfigured (see next page for a brief explanation) before it can operate on the communications bus.

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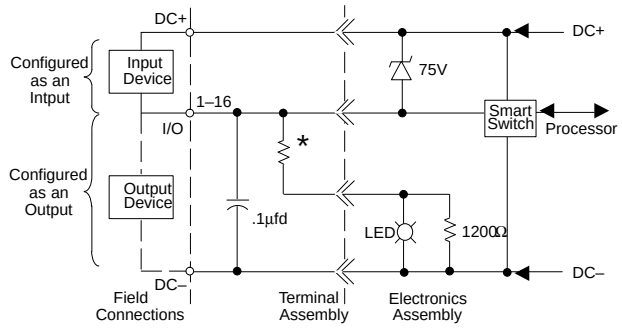
I/O Block Information Summary

Each circuit on the I/O block can be configured as an input, a tristate input, or an output. If the block is configured as a combination block, output feedback is provided via the corresponding input references.

All output devices connect to the negative (–) side of the power supply. Inputs control the positive (+) side.



* 5.6K ohms for 24/48 VDC blocks.
1.8K ohms for 24 VDC blocks

Circuit LEDs

Each circuit has its own LED. If the circuit is configured as an input, the LED indicates the presence of threshold voltage at the input terminal. If the circuit is configured as an output, the LED indicates the actual state of the load.

Diagnostics

The block reports all faults to the Hand–held Monitor, and takes appropriate corrective action.

- **Short Circuit Diagnostic (standard)** Instantaneous current exceeds 10 amps at turn–on.
- **Overtemperature Diagnostic (standard)** Internal temperature exceeds 100º C.
- **Failed Switch Diagnostic (standard)** Output switch state is not the same as its commanded state.. May also indicate certain internal block faults.
- **Open Wire Diagnostic (standard)** Electrical (not mechanical) malfunction on a tristate input.
- **Overload Diagnostic (configurable)**
- **No Load Diagnostic (configurable)**

Configuration

The block must be configured with an HHM to:

- Enter its Block Number (serial bus address).
- Enter its Reference Number (required only for IC550 and IC600 series PLCs only).

In addition, unless all circuits on the block will be inputs, the Block I/O Type must be set to either Outputs or Combination *on the Program Block ID screen*.

Warning

– Explosion Hazard – DO NOT connect a Hand-held Monitor to the block during operation in a CSA Class 1 Div 2 location.

The features below can be configured from an HHM (see the *Discrete and Analog Blocks User's Manual* for instructions) or the application program (as detailed in the *System and Communications User's Manual*).

Configurable Feature	Circuit or Block	Selection	Factory Setting
Block I/O Type	B	inputs, outputs, combination	inputs
Baud Rate	B	153.6st,153.6ex, 76.8, 38.4 Kb	153.6st
Pulse Test	B	enabled / disabled	enabled
Input Filter Time	B	5–100mS	20mS
Circuit I/O Type	C	input, output, tristate input	input
Report Faults	C	yes / no	yes
Hold Last State	C	yes / no	no
Output Def. State	C	on, off	off
Detect No Load	C	yes / no	yes
Overload S'down	C	yes / no	yes
BSM Present	B	yes / no	no
Outputs Def. Time	B	2.5 / 10seconds	3 bus scans
Redundancy Mode	B	none, duplex, standby, GMR	none
Duplex Default	B	on / off	off
Config. Protect	B	enabled / disabled	disabled

Note: If the block is configured offline, it must be properly grounded and have a 75W resistor installed across its Serial 1 and Serial 2 terminals. See the *Discrete and Analog Blocks User's Manual* for instructions.

Compatibility

Any Hand–held Monitor can be used with the NEMA4 I/O Station. However, version IC66*HHM501 is required to change baud rate configuration, or to configure the block for redundancy.

For an IC697 series PLC, the CPU and programming software must be version 2.0 or later. The bus controller must be IC697BEM731C or later.

For an IC600 series PLC, the CPU must be rev. 105 or later. For an IC66* series Plus PLC, rev. 110 or later is required. The programming software must be rel. 4.02 or later. If the bus controller is model IC66*CBB900, it must be version C or later.

For an IC550 series PLC, the CPU must be rev. 3.0 or later. The programming software must be rel. 2.01 or later.

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I/O Station Specifications

Catalog Numbers:	
NEMA4 I / O Station	IC66*BDX022
24VDC Source 16 Circuit Source I / O Block	IC66*BBD022
Terminal Assembly only	IC66*TBD022
Electronics Assembly only	IC66*EBD020
I / O Station Size (height x width x depth)	10.13 in (257.3 mm) x 7.63 in (193.8 mm) x 5.50 in (139.7 mm)
LEDS (block)	Unit OK, I / O Enabled
LEDs (each circuit)	Individual load side indicators
Heat Dissipation	tbd
Block to Block Isolation	1500 V
Operating voltage	18–56 VDC (24 / 48 V), 18–30 VDC (24 V)
Ripple (maximum)	10%
Required DC power	150 mA typical / 300 mA maximum
Power supply dropout time	10mS
Pass–through current	15 Amps, minus the power used by the I / O block and the devices connected to the I / O Station.
Input Characteristics:	
For standard input, voltage relative to (DC–)	Input ON: 16–24 VDC Input OFF: 0–7 VDC
Input processing time (typical)	5.6K ohms (24 / 48V), 1.8K ohms (24V)
Input impedance (typical)	1.7mS (plus selectable filter delay)
Selectable input filter times	5–100mS
Input diagnostics	Open wire, Overtemperature, Failed Switch
Output Characteristics:	
Output current (steady state)	2 amps per circuit
Maximum inrush current	10 amps up to 10mS
Block output current	15 amps at 35C
Output OFF leakage current	1.0 mA
Maximum switching frequency	Once per second (high inrush current)
Output turn–on delay (maximum)	1mS
Output voltage drop	2.0 volts maximum at 2 amps inrush
Minimum Recommended Load	50 mA with No Load nabled
Output Diagnostics	Short Circuit, Overload, No Load, Failed Switch, Overtemperature
Environmental:	
Operating temperature	tbd
Storage temperature	–40 to +100C (–40 to +212F)
Humidity	NEMA enclosure
Vibration	5–10Hz 0.2” (5.08mm) displacement, 10–200Hz at 1G

Temperature Derating

The illustration below shows total load current versus temperature derating for the NEMA4 I / O Station.